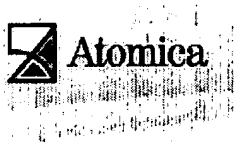

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DBMS

(DataBase Management System) Software that controls the organization, storage, retrieval, security and integrity of data in a database. It accepts requests from the application and instructs the operating system to transfer the appropriate data.

DBMSs may work with traditional programming languages (COBOL, C, etc.) or they may include their own programming language for application development.

DBMSs let information systems be changed more easily as the organization's requirements change. New categories of data can be added to the database without disruption to the existing system. Adding a field to a record does not require changing any of the programs that do not use the data in that new field.

MAJOR FEATURES OF A DBMS

Data Security

The DBMS can prevent unauthorized users from viewing or updating the database. Using passwords, users are allowed access to the entire database or a subset of it known as a "subschema." For example, in an employee database, some users may be able to view salaries while others may view only work history and medical data.

Data Integrity

The DBMS can ensure that no more than one user can update the same record at the same time. It can keep duplicate records out of the database; for example, no two customers with the same customer number can be entered.

Interactive Query

Most DBMSs provide query languages and report writers that let users interactively interrogate the database and analyze its data. This important feature gives users access to all management information as needed.

Interactive Data Entry and Updating

Many DBMSs provide a way to interactively enter and edit data, allowing you to manage your own files and databases. However, interactive operation does not leave an audit trail and does not provide the controls necessary in a large organization. These controls must be programmed into the data entry and update programs of the application.

This is a common misconception about personal computer DBMSs. Complex business systems can be developed in dBASE and Paradox, etc., but not without programming. This is not the same as creating lists of data for your own record keeping.

Data Independence

With DBMSs, the details of the data structure are not stated in each application program. The program asks the DBMS for data by field name; for example, a coded equivalent of "give me customer name and balance due" would be sent to the DBMS. Without a DBMS, the programmer must reserve space for the full structure of the record in the program. Any change in data structure requires changing all application programs.

DATABASE DESIGN

A business information system is made up of subjects (customers, employees, vendors, etc.) and activities (orders, payments, purchases, etc.). Database design is the process of organizing this data into related record types. The DBMS that is chosen is the one that can support the organization's data structure while efficiently processing the transaction volume.

Organizations may use one kind of DBMS for daily transaction processing and then move the detail to another DBMS better suited for random inquiries and analysis.

Overall systems design decisions are performed by data administrators and systems analysts. Detailed database design is performed by database administrators.

HIERARCHICAL, NETWORK AND RELATIONAL DATABASES

Information systems are made up of related files: customers and orders, vendors and purchases, etc. A key DBMS feature is its ability to manage these relationships.

Hierarchical databases link records like an organization chart. A record type can be owned by only one owner. In the following example, orders are owned by only one customer. Hierarchical structures were widely used with early mainframe systems; however, they are often restrictive in linking real-world structures.

In network databases, a record type can have multiple owners. In the example below, orders are owned by both customers and products, reflecting their natural relationship in business.

Relational databases do not link records together physically, but the design of the records must provide a common field, such as account number, to allow for matching. Often, the fields used for matching are indexed in order to speed up the process.

In the following example, customers, orders and products are linked by comparing data fields and/or indexes when information from more than one record type is needed. This method is more flexible for ad hoc inquiries. Many hierarchical and network DBMSs also provide this capability.

OBJECT DATABASES

Certain information systems may have complex data structures not easily modeled by traditional data structures. A newer type of database, known as the object database, can be employed when hierarchical, network and relational structures are too restrictive. Object databases can easily handle one-to-many relationships combined with many-to-one relationships.

The world of information is made up of data, text, pictures and voice. The relational DBMS was not designed to store multimedia data, because there are so many different types of sound and video formats. Although a relational DBMS may provide a BLOB (binary large object) field that holds anything, extensive use of this field can strain the processing.

An object database is often better suited for multimedia. Using the object model, an object-oriented DBMS can store anything or refer to anything. For example, a video object can reference a video file stored elsewhere on some other hard disk and launch the video player software necessary to play it.

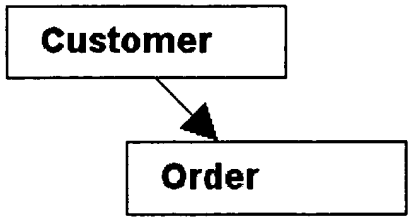
INTELLIGENT DATABASES

All DBMSs provide some data validation; for example, they can reject invalid dates or alphabetic data entered into money fields. But most validation is left up to the application programs.

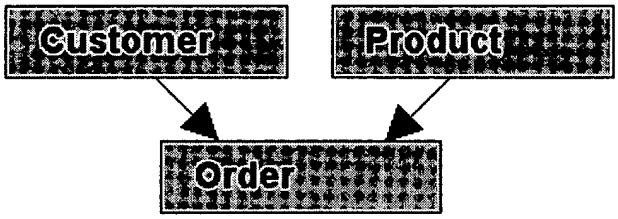
Intelligent databases provide more validation; for example, table lookups can reject bad spelling or coding of items. Common algorithms can also be used such as one that computes sales tax for an order based on zip code.

When validation is left up to each application program, one program could allow an item to be entered while another program rejects it. Data integrity is better served when data validation is done in only one place. Mainframe DBMSs are increasingly becoming intelligent. Eventually all DBMSs will follow suit.

Hierarchical

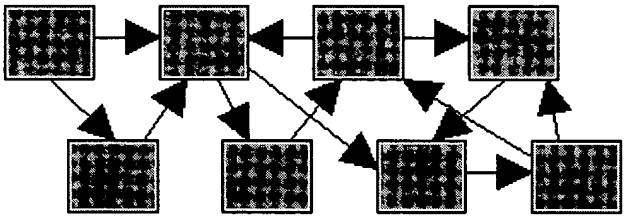


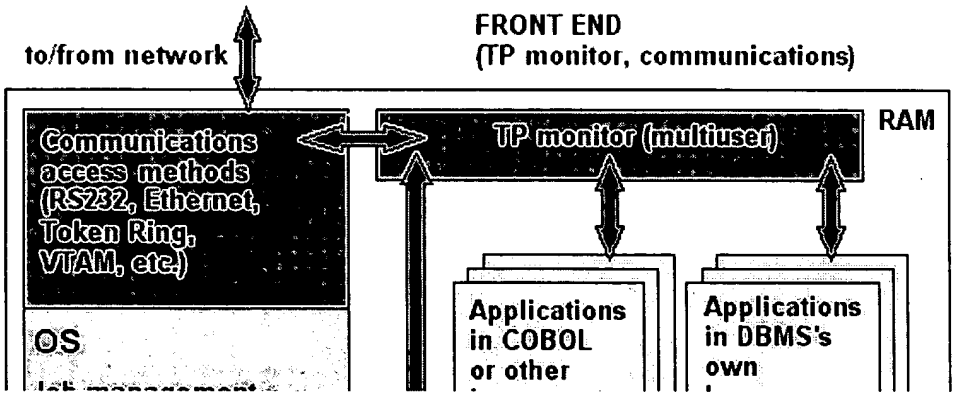
Network

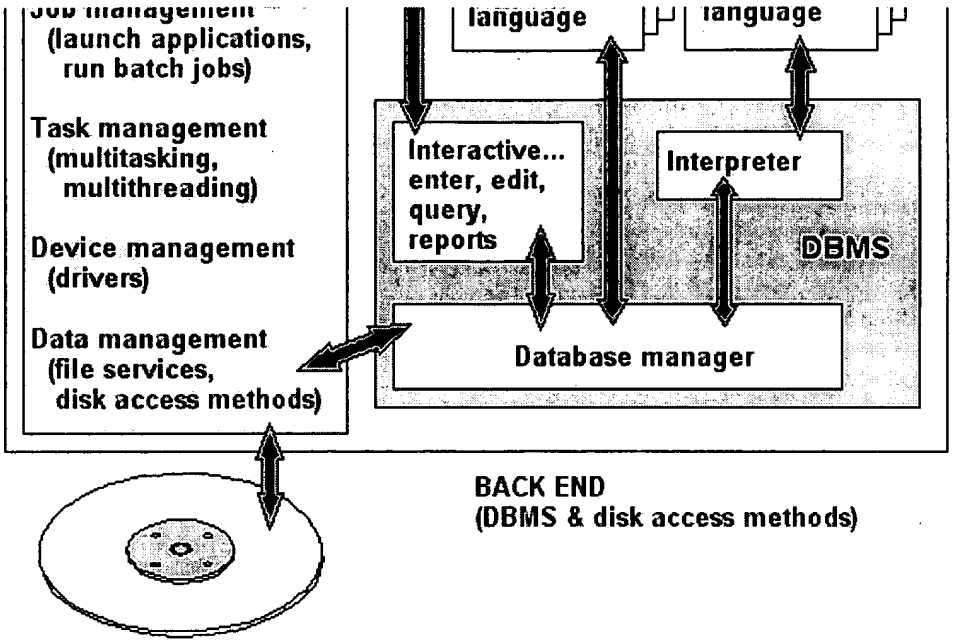


Relational

Objects







DBMS and OS Interaction

This diagram shows the interaction between the DBMS with other system and application software running in memory.

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OLAP

(**O**n**L**ine **A**nalytical **P**rocessing) Decision support software that allows the user to quickly analyze information that has been summarized into multidimensional views and hierarchies. For example, OLAP tools are used to perform trend analysis on sales and financial information. They can enable users to drill down into masses of sales statistics in order to isolate the products that are the most volatile.

Traditional OLAP products, also known as multidimensional OLAP, or MOLAP, summarize transactions into multidimensional views ahead of time. User queries on these types of databases are extremely fast, because the consolidation has already been done. OLAP places the data into a cube structure that can be rotated by the user, which is particularly suited for financial summaries.

Relational OLAP (ROLAP) tools extract data from traditional relational databases. Using complex SQL statements against relational tables, ROLAP is able to create multidimensional views on the fly. ROLAP tends to be used on data that has a large number of attributes, where it cannot be easily placed into a cube structure. For example, customer data with numerous descriptive fields are typically ROLAP candidates, rather than financial data.

A database OLAP, or DOLAP, refers to a relational DBMS that is designed to host OLAP structures and perform OLAP calculations.

A Web OLAP, or WOLAP, refers to OLAP data that is accessible from a Web browser.

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EIS

1. (**E**xecutive **I**nformation **S**ystem) An information system that consolidates and summarizes ongoing transactions within the organization. It provides top management with all the information it requires at all times from internal and external sources. If the EIS provides "what if?" manipulation capabilities like that of a DSS (decision support system), they are one in the same. See DSS.

2. (**E**nterprise **I**nformation **S**ervices) The back-end layer where the traditional data processing occurs in an organization, which includes the databases, mainframe and ERP applications.

3. (EIS International, Inc., Herndon, VA) Founded in Connecticut in 1980 by Robert Jesurum, EIS became a leading provider of advanced technology solutions for call centers worldwide. The firm's call center workstations are used in a wide variety of industries including finance, telecom and cable, publishing and market research. In 2000, EIS became a wholly-owned subsidiary of German-based SER Systeme AG (www.ser.com).

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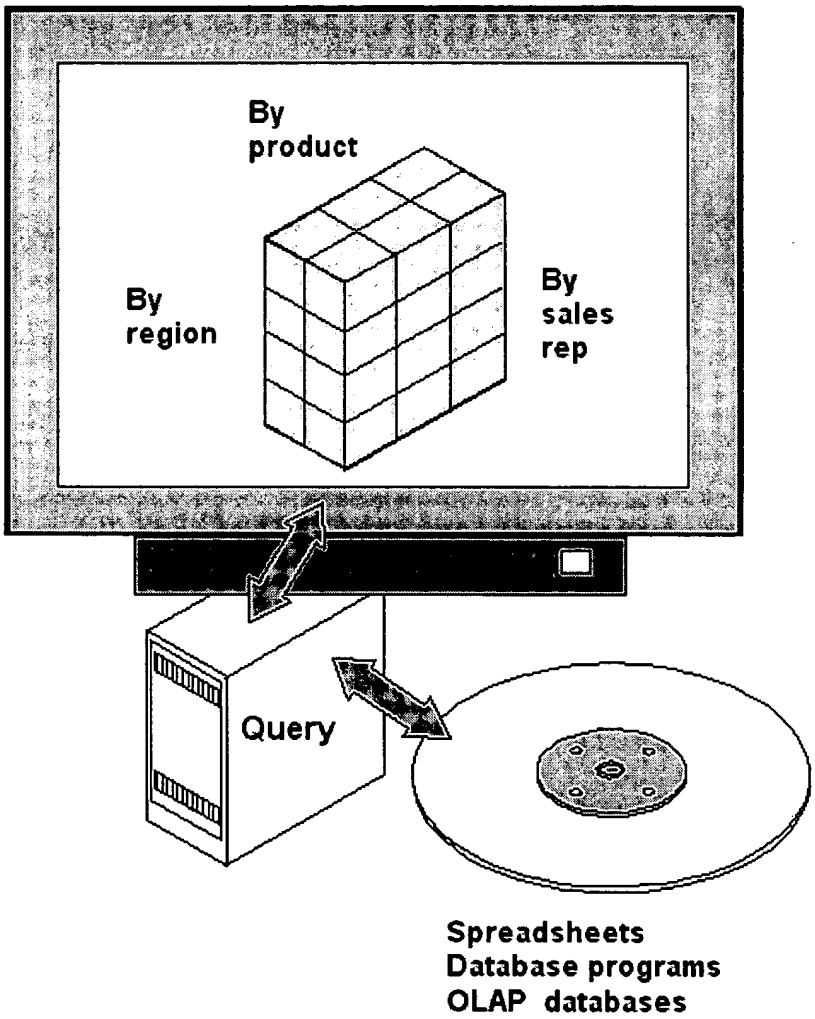
DSS

1. (**D**ecision **S**upport **S**ystem) An information and planning system that provides the ability to interrogate computers on an ad hoc basis, analyze information and predict the impact of decisions before they are made.

DBMSs let you select data and derive information for reporting and analysis. Spreadsheets and modeling programs provide both analysis and "what if?" planning. However, any single application that supports decision making is not a DSS. A DSS is a cohesive and integrated set of programs that share data and information. A DSS might also retrieve industry data from external sources that can be compared and used for historical and statistical purposes. An integrated DSS directly impacts management's decision-making process and can be a very cost-beneficial computer application. See EIS and OLAP.

Multidimensional views (pivot table)



Decision Support

Decision support systems increasingly use OLAP databases, which provide rapid access to multidimensional views of the data. A user can quickly flip from "by product" to "by region" with a multidimensional database.

can quickly flip from "by product" to "by region" with a multidimensional database.

2. (**D**igital **S**ignature **S**tandard) A National Security Administration standard for authenticating an electronic message. See RSA and digital signature.

3. (**D**igital **S**atellite **S**ystem) A direct broadcast satellite (DBS) system from Hughes Electronics Corporation that delivers more than 175 TV channels. DSS receivers and dishes are made by RCA and other manufacturers. USSB and DirecTV provide the content. See DBS.

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axiom

noun

A broad and basic rule or truth : fundamental, law, principle, theorem, universal.

ax·i·om (ăk'sē-əm)

n.

1. A self-evident or universally recognized truth; a maxim: *"It is an economic axiom as old as the hills that goods and services can be paid for only with goods and services"* (Albert Jay Nock).
2. An established rule, principle, or law.
3. A self-evident principle or one that is accepted as true without proof as the basis for argument; a postulate.

[Middle English, from Old French *axiome*, from Latin *axi ma, axi mat-*, from Greek, from *axios*, worthy.]

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feedback

A process in which a system regulates itself by monitoring its own output. That is, it "feeds back" part of its output to itself. Feedback is used to control machines; a heating system, for example, uses a thermostat to monitor and adjust its output. Feedback is also used by the human brain to control various muscles and joints.

• By extension, "feedback" is any response or information about the result of a process. • Feedback is usually a feature of automation.